

REMARKS

Preliminary Remarks:

Upon entry of this Amendment, claims 1 to 20 will be pending of which claim 1 is independent. Claims 1, 3, 10, 18, and 19 are amended to better describe the claimed subject matter and to better correspond to current U.S. patent practice. No new matter is added.

Claim Objections:

Claims 1, 3, 4, 8, 10, 11, 18, and 19 were objected to for informalities. Applicants respectfully traverse.

Applicants respectfully point the Examiner to the Manual of Patent Examining Procedure (M.P.E.P.) §§ 2173.01 and 2173.02, which clearly state that Applicants are their own lexicographers and that the focus of examination should be whether patentable subject matter is described with “a reasonable degree of particularity and distinctness” and “not whether more suitable language or modes of expression are available.” Applicants respectfully submit that claims 1, 3, 4, 8, 10, 11, 18, and 19 are not informal and the terms that the Examiner has objected to (such as “wherein” or “comprise”) are perfectly acceptable as written. Accordingly, Applicants respectfully request withdrawal of the objection to the claims.

Claim Rejections:

Rejection under 35 U.S.C. § 112

Claims 1, 3, 10, 18, and 19 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant respectfully submits that as amended claims 1, 3, 10, 18, and 19 are not indefinite under 35 U.S.C. § 112, second paragraph. Therefore, Applicant respectfully request withdrawal of this rejection.

Rejections under 35 U.S.C. § 103

Claims 1, 2, 4, 6, 8, and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilhelmi (DE 4 420 294). Applicants respectfully traverse.

Ceramic materials are conventionally prepared from slurries including a binder and powder mixtures that are fired at high temperature. The powder particles usually do not undergo chemical reactions. In the present application, the ceramic material does not contain any binder,

and the β -SiC network is formed during heat treatment by a chemical reaction between carbon, which is obtained by pyrolysis of resin, and silicon powder through a gas phase vector (SiO). Therefore, the reactive process of forming a SiC network is not a conventional ceramic process.

The Examiner's statement in the Office Action that "an aluminum smelting furnace is an obvious variant of an incinerator" is incorrect. Office Action at page 6. One of ordinary skill in the art would never consider an aluminum smelting furnace as an incinerator as these operate with completely different mechanisms of corrosive attack. An aluminum smelting furnace uses a molten salt bath while incinerators use corrosive gases. Indeed, one of ordinary skill in the art would never use an aluminum smelting furnace if one needed an incinerator and therefore, an aluminum smelting furnace is absolutely not an "obvious variant" of an incinerator – at least not "obvious" to one of ordinary skill in the art.

Wilhelmi discloses that conventional SiC ceramic bricks may form the "first layer" (*erste Lage*, as defined in column 1, lines 42 to 43) that is not in direct contact with the combustion gas but with the wall of the combustion chamber. It is the second layer (*zweite Lage*, as defined in column 1, lines 52 to 53) that is in direct contact with the combustion gases. For the second layer, a higher corrosion resistance is required (*see*, column 2, lines 28 to 30), and thus bricks containing at least 50% by weight of alumina are used. Wilhelmi thus teaches away from using SiC bricks in contact with the combustion gases in incineration furnaces.

In conclusion, Applicants respectfully submit that claims 1, 2, 4, 6, 8, and 15 are not unpatentable under 35 U.S.C. § 103(a) over Wilhelmi and respectfully request withdrawal of this rejection.

Claims 1, 2, 4, 6, 8, 16, and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cortellini (U.S. Pat. No. 5,876,584). Applicants respectfully traverse.

Cortellini is dealing with bricks made of ceramic SiC, which is usually α -SiC. This product is obtained by sintering (*see*, column 3, lines 64 to 65) and comprises a binder and sintering aid (*see* column 3, lines 61 to 62). The process disclosed in the current application is different because it is not a ceramic sintering process, but a process based on the chemical reaction between carbon (obtained by pyrolysis of a resin containing carbon black) and silicon powder. Therefore, the product resulting from the process disclosed in the current application is different from the Cortellini product, as it does not comprise any binder. Furthermore, the

claimed composite material may contain inclusions, which is not contemplated by Cortellini. The process disclosed in the current application does not require any inert gas or vacuum to avoid oxidation of the SiC during final heat treatment.

The matrix of the claimed composite material is made of β -SiC. Stability of linings for molten salt electrolysis is critical. In *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), the Supreme Court states that patentability is barred if the substitution of one known element for another yields predictable results. *KSR*, 550 U.S. at 417. Ceramic α -SiC products, like those disclosed in Cortellini, are known to resist in cryolith-alumina cells. It is by no means obvious that β -SiC products would resist molten salt electrolysis conditions, which are among the most aggressive media known in chemistry. Moreover, non-ceramic materials as claimed have never been used before for these types of applications. In other words, the Examiner's statement that the selection of α -SiC or β -SiC being "not inventive" is incorrect because the results of substituting the ceramic α -SiC products of Cortellini with the non-ceramic β -SiC products as claimed would not yield predictable results. *In re Marosi*, 710 F.2d 799 (Fed. Cir. 1983) or *In re Thorpe*, 777 F.2d. 695 (Fed. Cir. 1985), two cases cited by the Examiner, are not relevant.

In conclusion, Applicants respectfully submit that claims 1, 2, 4, 6, 8, 16, and 17 are not unpatentable under 35 U.S.C. § 103(a) over Cortellini and respectfully request withdrawal of this rejection.

Claims 1 to 14 and 16 to 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gadkaree *et al.* (U.S. Pat. No. 6,555,031) in view of Cortellini. Applicants respectfully traverse.

The process described by Gadkaree *et al.* uses a temperature range of the last heat treatment between 1400°C (column 7, line 65) and 2400°C (claim 17), with a preferred range of 1400°C and 1800°C. Under those conditions, α -SiC is likely to be formed instead of β -SiC.

The Examiner alleges that one of ordinary skill in the art would test the material of Gadkaree *et al.* for the uses suggested by Cortellini. Office Action at page 10. However, as explained above, these materials result from a very different process, and cannot be expected to behave in the same way. Gadkaree *et al.* aim for the production of thin-walled porous honeycomb SiC structures (column 3, lines 48 to 52). One of ordinary skill in the art reading Gadkaree *et al.* would not have any idea to test the material disclosed in Gadkaree *et al.* under

conditions of molten salt electrolysis and in contact with molten aluminum. The material disclosed in Gadkaree *et al.* is so porous that it cannot be expected to show sufficient chemical resistance, especially to one of the most corrosive mixtures known. In contrast, the claimed SiC-based composite material is a dense, non porous material that is capable of being used as an inner coating for an aluminium smelting furnace or as an inner coating for a fused salt electrolytic cell,.

Applicants respectfully submit that claims 1 to 14 and 16 to 20 are not unpatentable under 35 U.S.C. § 103(a) over Gadkaree *et al.* in view of Cortellini and respectfully request withdrawal of this rejection.

Claims 1 to 6, 8 to 15, and 18 to 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gadkaree *et al.* in view of Wilhelmi. Applicants respectfully traverse.

Applicants have discussed Gadkaree *et al.* and Wilhelmi previously. Neither of these references individually renders obvious claims 1 to 6, 8 to 15, and 18 to 20. Furthermore, just like Cortellini, Wilhelmi does not overcome the deficiencies of Gadkaree *et al.* Therefore, Applicants respectfully submit that claims 1 to 6, 8 to 15, and 18 to 20 are not unpatentable under 35 U.S.C. § 103(a) over Gadkaree *et al.* in view of Wilhelmi and respectfully request withdrawal of this rejection.

Rejection under the judicially created doctrine of nonstatutory obviousness-type double patenting

Claims 1 to 4, 6 to 8, 10, 11, and 13 to 20 were provisionally rejected under the judicially created doctrine of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 8 to 10, and 14 to 20 of co-pending U.S. Pat. Appl. No. 11/569,103. Applicants respectfully request that this rejection be held in abeyance until the final disposition of the earlier of the present application or U.S. Pat. Appl. No. 11/569,103.

CONCLUSION

In view of the amendments and remarks above, Applicants respectfully submit that this application is in condition for allowance and request favorable action thereon. The Examiner is invited to contact the undersigned if any additional information is required.

As this response is filed within the statutory period for reply, Applicants believe that no fees, other than for a two-month extension of time, are due. If any additional fees are required, they may be charged to Deposit Account No. 50-4254, referencing Attorney Docket No. 2901653-000011.

Respectfully submitted,

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